

LECTURE: 3-5 IMPLICIT DIFFERENTIATION (PART 2)

Example 1: Review. Find $\frac{dy}{dx}$ by implicit differentiation.

$$\sin(x + y) - 2xy = 3$$

Example 2: If $g(x) + x \sin g(x) = 3x^2 + 1$ and $g(1) = 0$ find $g'(1)$.

Derivatives of Inverse Trigonometric Functions

Implicit differentiation is also used to derive formulas for derivatives of inverse functions.

Example 3: Find the derivatives of the following functions.

(a) $y = \sin^{-1} x$

(b) $y = \tan^{-1} x$

Derivatives of Inverse Trigonometric Functions:

- $\frac{d}{dx}(\sin^{-1} x) = \underline{\hspace{2cm}}$

- $\frac{d}{dx}(\cos^{-1} x) = \underline{\hspace{2cm}}$

- $\frac{d}{dx}(\tan^{-1} x) = \underline{\hspace{2cm}}$

Example 4: Differentiate the following functions.

(a) $y = \cos^{-1}(3x + 5)$

(b) $y = \arctan 2x$

Example 5: Differentiate the following functions.

(a) $f(t) = \arcsin(\sqrt{t})$

(b) $y = x \sin^{-1} x + \sqrt{1 - x^2}$